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The Patent Office
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REC'D 24 MAY 2000

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PCT

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I also certify that the attached copy of the request for grant of a Patent (Form 1/77) bears an amendment, effected by this office, following a request by the applicant and agreed to by the Comptroller-General.

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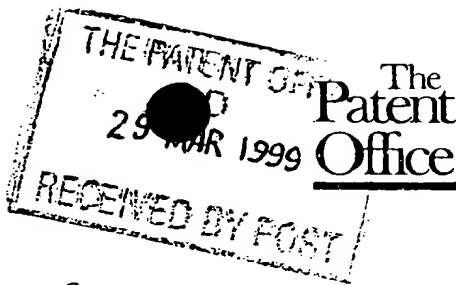
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The Patent Office

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SMART SPANNER

2. Patent application number

(The Patent Office will fill in this part)

3. Full name, address and postcode of the or of each applicant (underline all surnames)

NIGEL ALEXANDER BUCHANAN,
BEECHTREE COTTAGE,
NEW GILSTON
BT LIVEN, FIFE
KY8 5TF 065 1176 0001

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

SMART SPANNER

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

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NEW GILSTON,
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KY8 5TF~~
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373 SCOTLAND STREET
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FS1/M 10/4/00

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6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country Priority application number (if you know it) Date of filing (day / month / year)

N/A

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application Date of filing (day / month / year)

N/A

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body.
- See note (d))

No

Patents Form 1/77

9. Enter the number of sheets of any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form

Description

5

Claim(s)

1

Abstract

1

Drawing(s)

4 & 4 & 4

10. If you are also filing any of the following, state how many against each item.

Priority documents

1

Translations of priority documents

1

Statement of inventorship and right to grant of a patent (Patents Form 7/77)

1

Request for preliminary examination and search (Patents Form 9/77)

1

Request for substantive examination (Patents Form 10/77)

1

Any other documents (please specify)

1

11. I/we request the grant of a patent on the basis of this application.

Signature

[Signature]

Date 26/3/99

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Notes

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SMART SPANNER

This invention relates to a Smart Spanner.

Ring Spanners are well known, they are used for the tightening or slackening of known screw nuts or bolts. In use the hexagonal flats and corners on the inner side of the Spanner Ring grip the hexagonal flats and corners of the screw nuts or bolts to be tightened or slackened such that when the spanner shaft is rotated in the appropriate direction the screw nut or bolt is slackened or tightened as required. However if the screw nut or bolt is undersized, damaged or worn, it is very likely that the ring spanner will 'slip' instead of properly gripping or engaging the flats and corners of the screw nuts or bolts to be tightened or slackened.

According to the present invention there is provided a Smart Spanner comprising of a novel ring spanner whereas the inner area of the spanner ring can be substantially reduced during use to enhance the gripping action of the inner Smart Spanner ring on normal, undersized, damaged or worn screw nuts or bolts. Providing there is sufficient initial grip the more torque applied to the Smart Spanner Ring the more the inner area of the Smart Spanner Ring reduces, further enhancing the Smart Spanner Ring's grip on the known screw or nut to be turned, greatly reducing the opportunity of Spanner 'slip' occurring and the subsequent screw nut or bolt damage or the failure of the Spanner to tighten or slacken the screw nut or bolt to be turned.

A special embodiment of the invention will now be described by way of example with reference to the accompanying drawings which:-

- Figure 1** Illustrates in perspective the Smart Spanner gripping a screw nut whereas torque is being applied in the correct direction whereby the ramp cam, pin or roller is acting on the decreasing ramp incorporated in the end segment of the Smart Spanner Ring thereby closing the Smart Spanner Ring.
- Figure 1a** Shows in perspective the worn screw nut gripped by the inner Smart Spanner Ring in figure 1.
- Figure 2** Illustrates in front elevation the Smart Spanner Ring with no torque applied showing the convex curves of the inner Smart Spanner Ring relieved at the corners by smooth curves. The end segment of the Spanner Ring incorporating a decreasing ramp opposite a ramp cam protruding from the Spanner shaft.
- Figure 2a** Shows in front elevation the Smart Spanner as in Fig 2 whereas the end segment of the Smart Spanner Ring incorporates a catch to prevent the Spanner Ring being damaged by operation in the wrong direction.
- Figure 2b** Shows in end elevation the Smart Spanner as in Fig 2a.
- Figure 3** Shows in front elevation the Smart Spanner whereas the Smart Spanner Ring is partially hinged. The partially hinged Smart Spanner Ring is shown in differing positions of open-ness.

Figure 4 Illustrates in front elevation the Smart Spanner whereas the Smart Spanner Ring is hinged at more than one corner of the inner Smart Spanner Ring.

Figure 4a Shows in front elevation the Smart Spanner as in Fig 4 whereas the Smart Spanner Ring is shown in an open position.

Figure 4b Shows in side elevation the Smart Spanner as in Fig 4a.

Referring to the drawings the Smart Spanner (1) comprises of a shaft (2) with a Smart Spanner Ring (3) at either one or both ends. The Smart Spanner Ring end segment (3a) incorporates a decreasing ramp (3b) opposite the ramp cam, pin or roller (4) attached to the shaft (2) with a preferable ring stop (7). The preferably hexagonal inner ring (3h) of the Smart Spanner (1) consists of convex curves (3d) relieved at their corners (3c) by smooth curves. In a further example of the Smart Spanner (1) the Smart Spanner Ring end segment (3a) further incorporates a safety catch (3f) to prevent damage to the Smart Spanner Ring (3) if the Smart Spanner (1) is operated in the wrong direction.

A preferable operating direction indicator (5) is shown on the shaft (2).

A further example of the Smart Spanner Ring (3) is shown whereas one or more of the corners (3c) of the hexagonal inner ring (3h) consists of known swivels or hinges (3g) between the Smart Spanner Ring segments (3e).

Any known screw nut or bolt depicted is numbered (6) and hexagonal flats numbered (6a).

In use the Smart Spanner (1) engages the known screw nut or bolt (6) to be tightened or slackened via its inner hexagonal ring (3h) as the Smart Spanner (1) is operated in the correct direction as indicated by the preferable direction indicator (5) providing there is sufficient initial grip , part of the torque applied to the shaft (2) is transmitted inwardly by the ramp cam, pin or roller (4) onto the decreasing ramp (3b) incorporated into the end segment (3a) of the Smart Spanner Ring (3) the Smart Spanner Ring (3) end segment (3a) is propelled inwards by the force applied to the decreasing ramp (3b) by the ramp cam, pin or rollers (4) towards the ring stop (7).

The inner hexagonal shape of the inner Spanner ring (3h) is shaped to relieve the stresses within the Spanner Ring (3) material as the Spanner Ring (3) deforms inwards the corners (3c) of the inner hexagonal Spanner Ring (3h) are relieved by smooth curves and the 'flats' of the inner hexagonal Spanner Ring (3h) consist of convex curves (3d) which contact the known screw, nut or bolts (6) hexagonal flats (6a) at approximately the mid points of these flats (6a). If the known screw, nut or bolt (6) is damaged or worn , providing there is sufficient hexagonal flat (6a) or flats (6a) available to enable the Smart Spanner hexagonal inner ring (3h) to engage and grip the known screw nut or bolt (6) , the Smart Spanner Ring (3) will deform inwards to provide further grip enabling further torque to be used to turn the known screw, nut or bolt (6).

A further embodiment of the invention is the incorporation of a swivel or hinge (3g) between the shaft (2) and Spanner Ring (3) such that the Spanner Ring (3) can swivel open to allow a known tube or pipe to pass into the Smart Spanner hexagonal inner ring (3h). When the hinged section (3g) of the Spanner ring (3) is closed and the decreasing ramp (3b) is engaged against the ramp cam , pin or roller (4) the Smart Spanner (1) can be used to tighten or slacken appropriately sized known pipe nuts. The Smart Spanner (1) can be removed by reversing this procedure.

Alternatively each corner (3c) of the Smart Spanner Ring (3) can consist of swivels or hinges (3g) allowing a greater range of hexagonal or other shapes to be engaged and especially a known screw, nut or bolt (6) where it is difficult to engage the Smart Spanner (1) in a normal manner.

Abstract

A Smart Spanner (1) consisting of an inwardly deformable Spanner Ring (3) whereas when torque is applied to the Smart Spanner shaft (2) in the correct direction the hexagonal inner spanner ring (3h), which consists of inward convex curves (3d) relieved at their corners (3c) by smooth curves, grips the hexagonal flats (6a) of the operated known screw nut or bolt (6) via approximately the mid-point of their hexagonal flats (6a). Providing there is sufficient initial grip, the inner Spanner Ring (3h) will deform closing inwards greatly increasing its grip on the flats (6a) of the known screw nut or bolt (6) as the decreasing ramp (3b) on the Spanner Ring end segment (3a) is forced inwards by the inwardly directed force acting through the curved cam (4) protruding from the Spanner shaft (2) as the Spanner shaft (2) has torque applied in the appropriate direction thus enabling greater torque to be used to turn damaged, worn or undersized screw nuts or bolts (6).

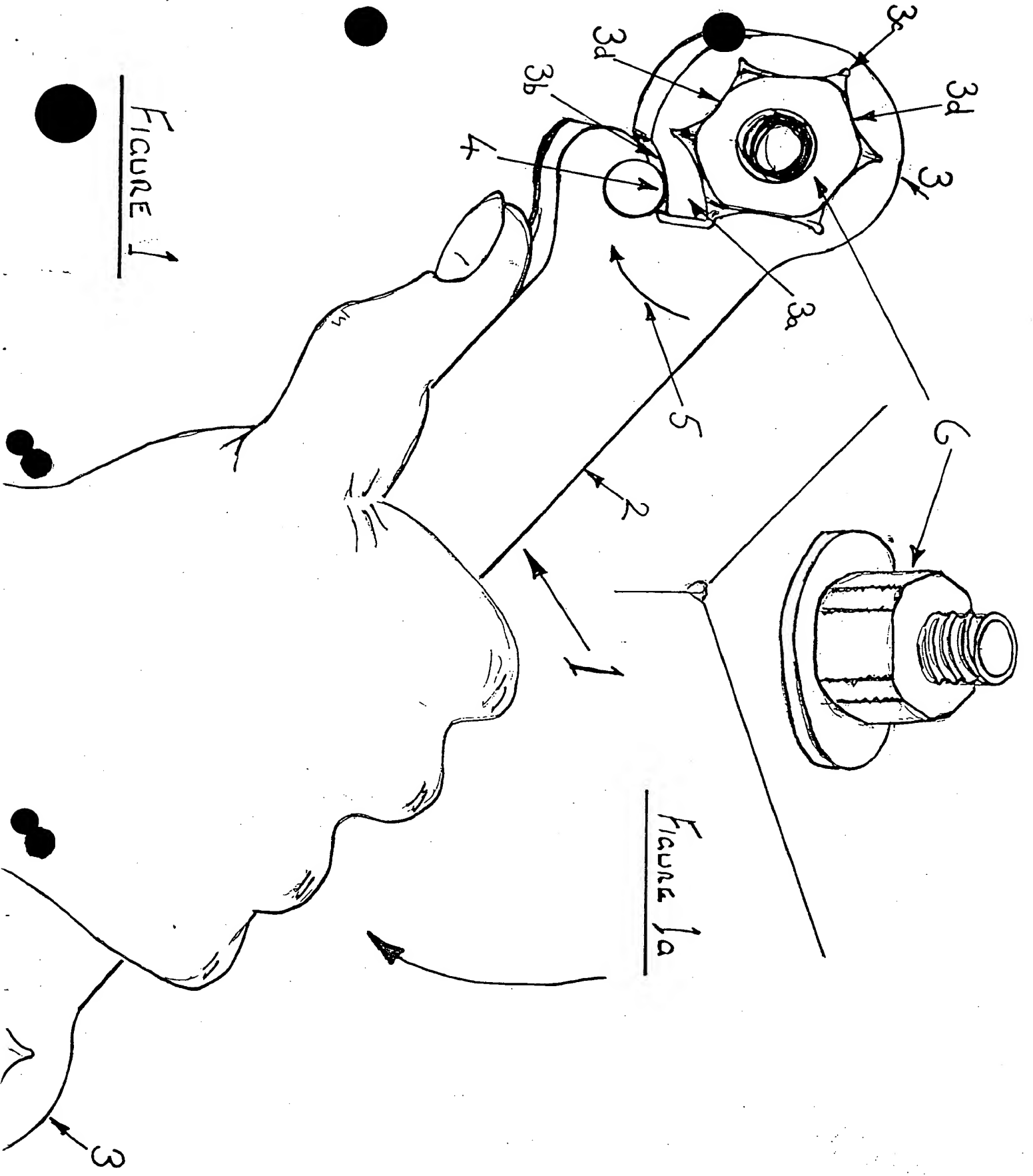


FIGURE 1

FIGURE 1a

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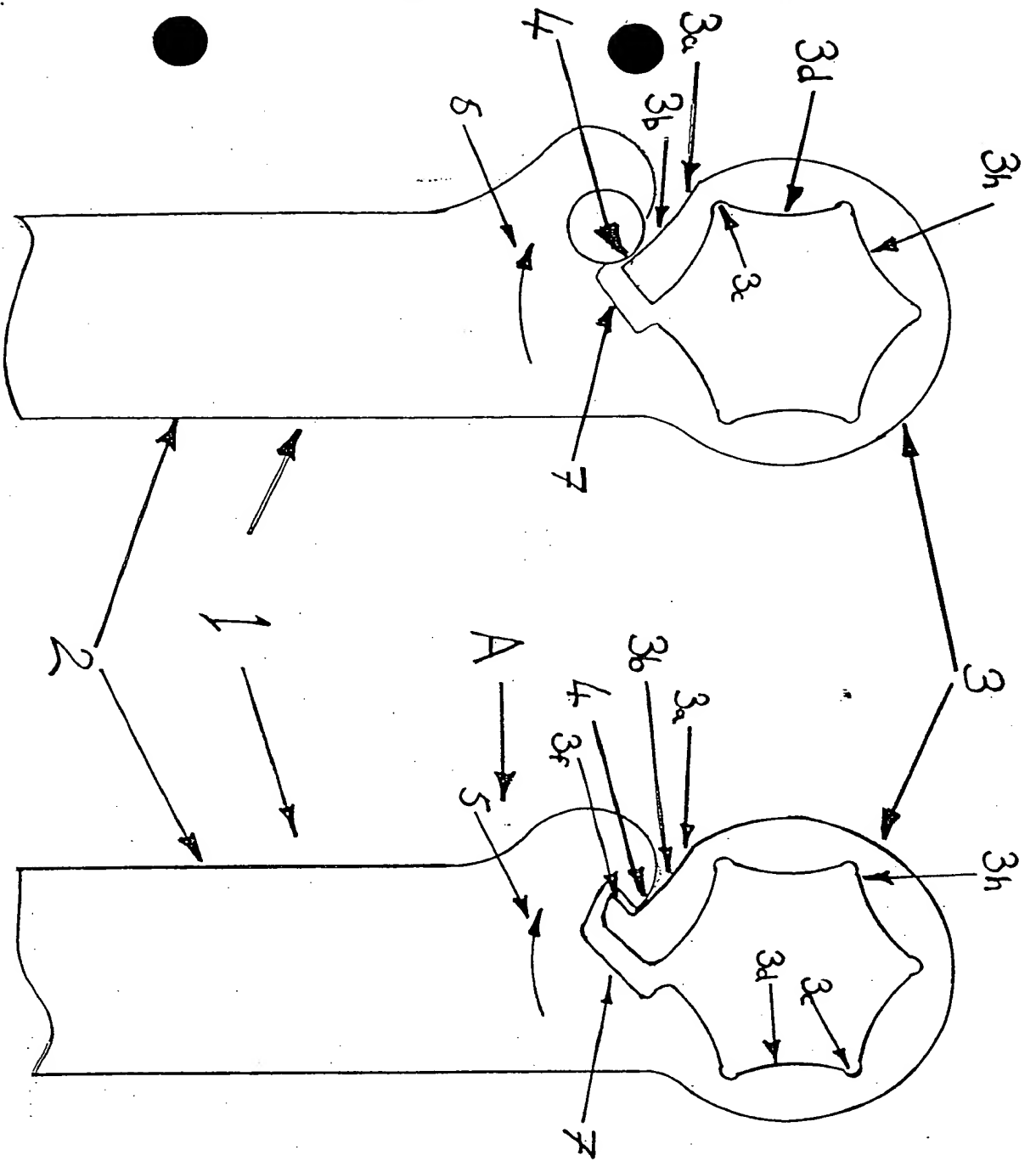


FIGURE 2

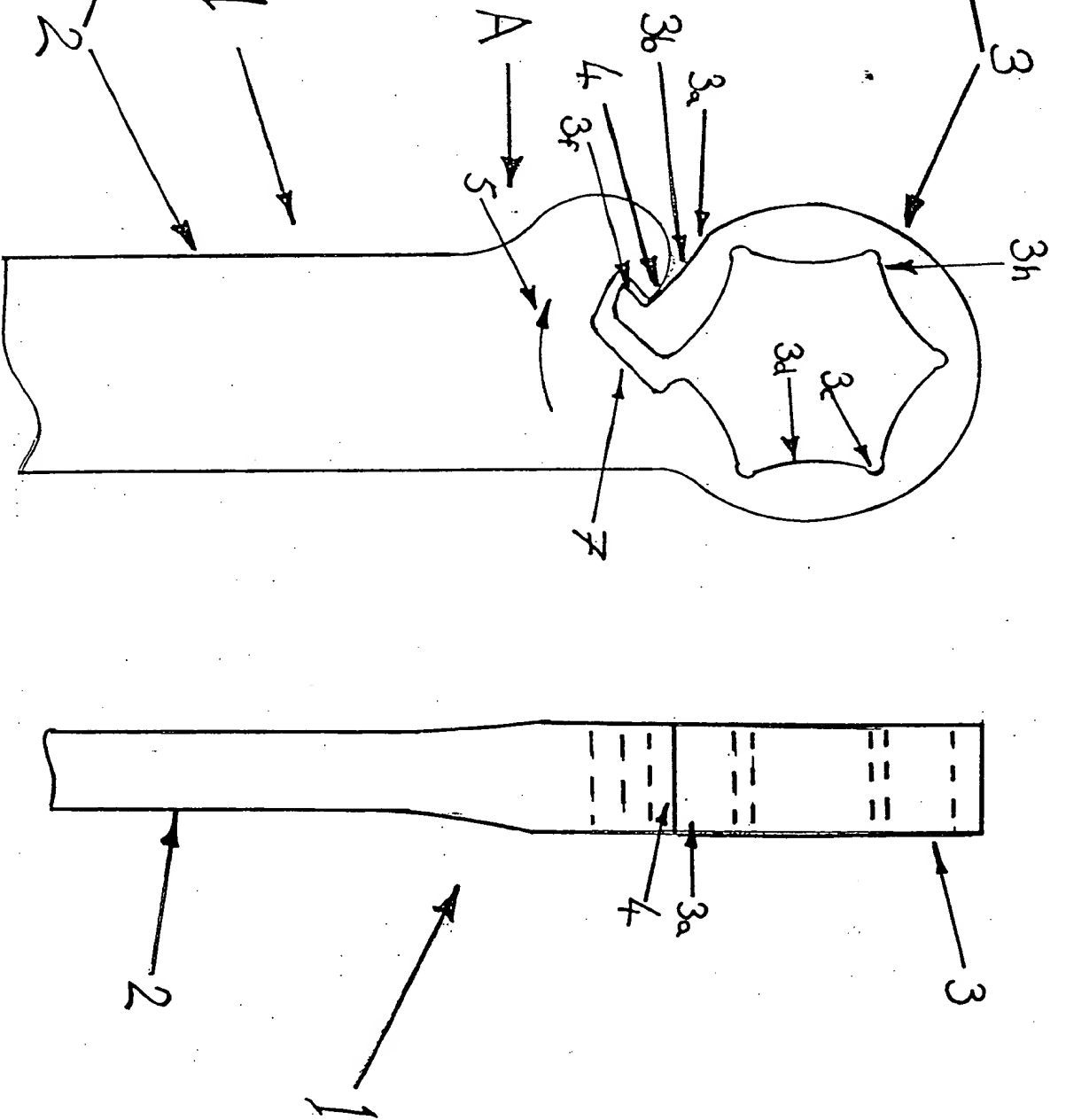


FIGURE 2a

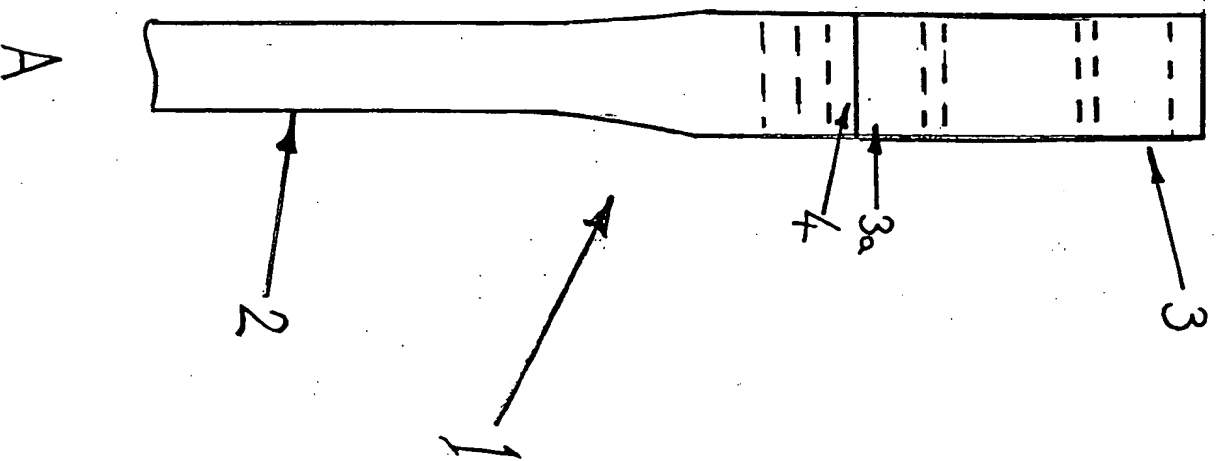


FIGURE 2b

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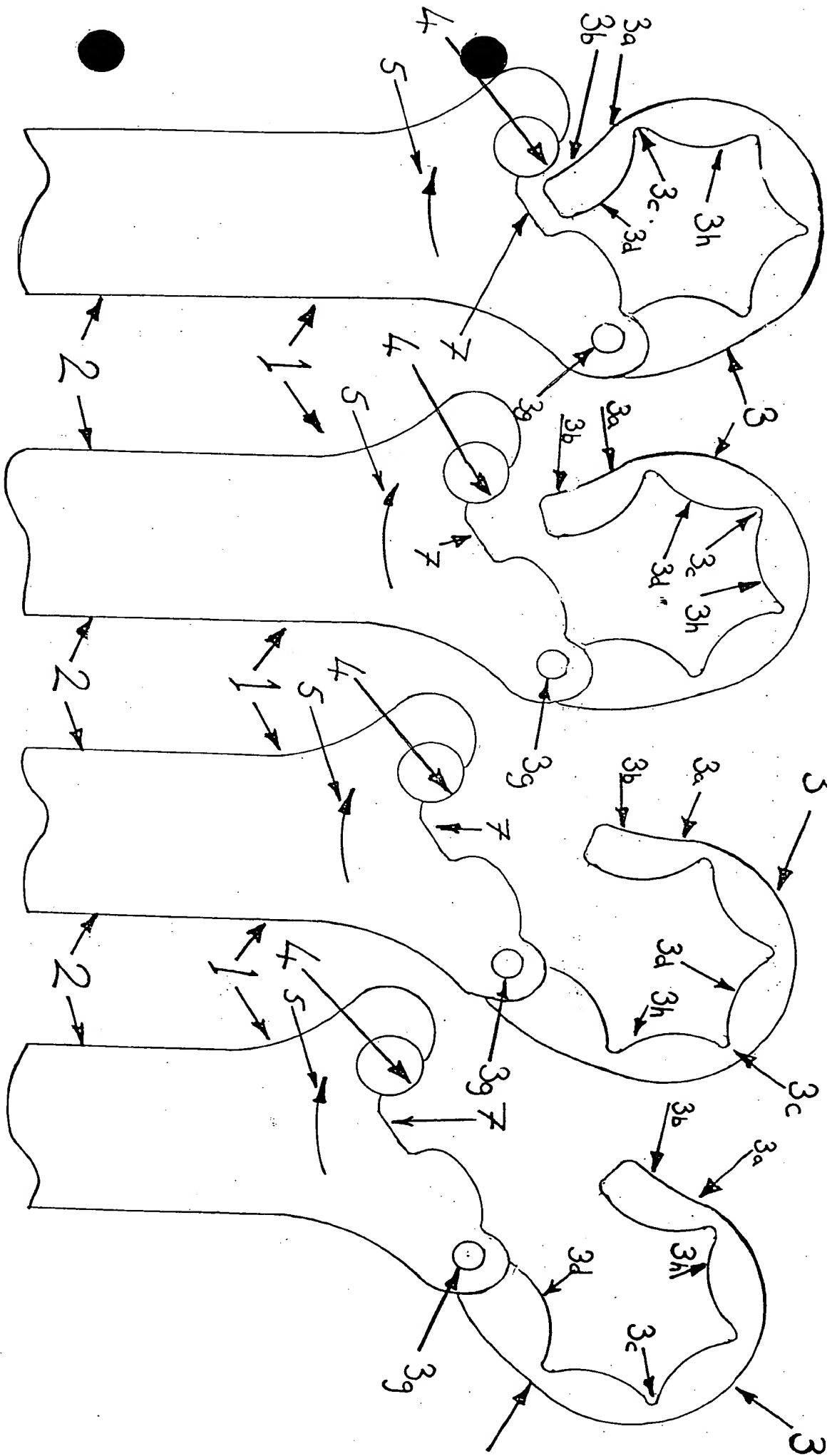


FIGURE 3

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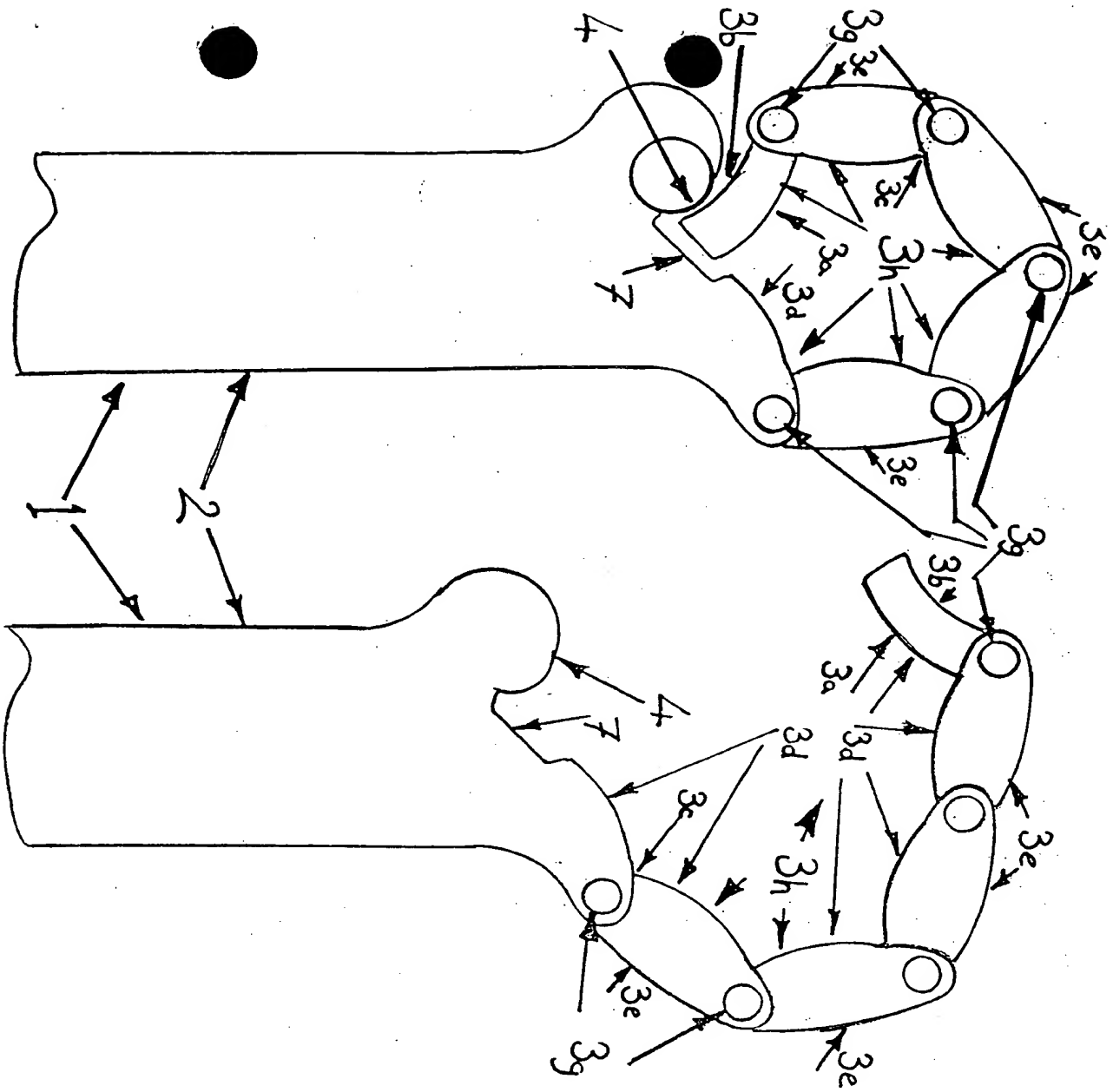


FIGURE 4a

FIGURE 4b

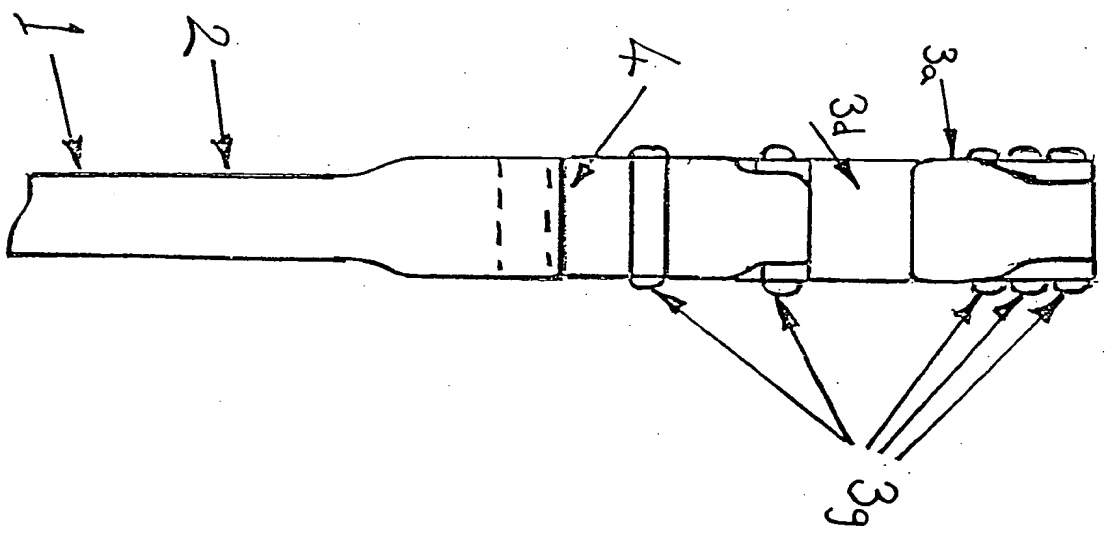


FIGURE 4c

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